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Air Products

Industrial Gas Division

Oxygen Material Safety Data Sheet

DPM 155

EMERGENCY PHONE: 800—523-9374 IN PENNSYLVANIA: 800—322-8092	TRADE NAME AND SYNONYMS Oxygen, LOX (Liquid only), GOX (Gas only)	CHEMICAL NAME AND SYNONYMS Oxygen
ISSUE DATE AND REVISIONS Issued: 13 April 1977 Rev: 16 February 1981	FORMULA O_2 MW: 32.00	CHEMICAL FAMILY Oxidizing gas

HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
N/A

SYMPTOMS IF INGESTED, CONTACTED WITH SKIN, OR VAPOR INHALED
Oxygen is nontoxic under most conditions of use and is necessary to support life. Liquid oxygen or cold gas will freeze tissues and can cause severe cryogenic (extremely low temperature) burns.

TOXICOLOGICAL PROPERTIES
Oxygen is nontoxic under usual conditions of use. Breathing pure oxygen at one atmosphere, however, may produce cough and chest pains within 8-24 hours. Concentrations of 60% may produce these symptoms in several days. At two atmospheres symptoms occur in 2-3 hours.
Partial pressure of oxygen in excess of two atmospheres may produce a variety of central nervous system manifestations including tingling of fingers and toes, visual and hearing disturbances, abnormal sensations, impaired coordination, confusion, muscle twitching, and seizures resembling those of epilepsy. Severe hazards may be present when confusion and impaired judgment lead to operational errors.
Infants exposed to oxygen levels in excess of 35-40% may suffer permanent visual impairment or blindess due to retrolental fibroplasia.

RECOMMENDED FIRST AID TREATMENT
If cryogenic liquid or cold boil-off gas contacts a worker's skin or eyes, frozen tissues should be flooded or soaked in tepid water (105-115F; 41-46C). DO NOT USE HOT WATER. Burns which result in blistering or deeper tissue freezing should be seen promptly by a physician.

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	AUTO IGNITION TEMP	FLAMMABLE LIMITS	LEL	UEL
N/A	N/A	N/A	N/A	N/A

EXTINGUISHING MEDIA
N/A

ELECTRICAL CLASSIFICATION
GROUP N/A

SPECIAL FIRE FIGHTING PROCEDURES
Oxygen is nonflammable, but supports and VIGOROUSLY ACCELERATES COMBUSTION of flammables. To fight fires, shut off sources of oxygen and fight like conventional fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Oxygen is nonflammable, but supports and VIGOROUSLY ACCELERATES COMBUSTION of flammables. Some materials which are noncombustible in air will burn in the presence of oxygen.

PHYSICAL DATA

BOILING POINT (°F)	FREEZING POINT (°F)
@ 1 atm. -297.3F (-183.0C)	@ 1 atm -361.8F (-218.8C)
VAPOR PRESSURE (psia)	SOLUBILITY IN WATER
N/A	@ 77F (25C), 1 atm 3.16% by volume

VAPOR DENSITY (lb/cu ft)	SPECIFIC GRAVITY (AIR = 1)	LIQUID DENSITY (lb/cu ft)	SPECIFIC GRAVITY (H_2O = 1)
@ 68F (20C), 1 atm 0.08309	@ 68F (20C), 1 atm 1.10	@ boiling point, 1 atm 71.21	@ boiling point, 1 atm 1.14

APPEARANCE AND ODOR
Gaseous oxygen is colorless and odorless. Liquid oxygen is pale blue and odorless.

DISCLAIMER

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Printed in U.S.A. 310-811

REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		Materials which burn in air will burn violently in atmosphere richer than approx. 25% oxygen. Some materials will burn in pure oxygen which are nonflammable in air.
	STABLE	X	

INCOMPATIBILITY (Materials to avoid)
All flammables, especially petroleum products, asphalt, other volatile flammables.

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	None

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Prevent liquid oxygen from contacting grease, oil, asphalt or combustibles. Ventilate area to evaporate and disperse oxygen. Flush area with large quantities of water. DO NOT ENTER areas of high oxygen concentration, which can saturate clothing and increase its flammability. Avoid smoking and contact with sources of ignition after exposure to concentration of oxygen higher than the normal atmosphere.

WASTE DISPOSAL METHOD
Allow liquid oxygen to evaporate in a well ventilated outdoor area. Vent oxygen gas to outside location. Disposal site should be remote from work areas, open flames or sources of ignition and combustibles. Flushing with water will increase the vaporization rate of the liquid. Do not attempt to dispose of residual oxygen in compressed gas cylinders. Return cylinders to Air Products with residual pressure, the cylinder valve tightly closed and valve cap in place.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)
N/A

VENTILATION		OTHER
Prevent accumulation with natural or forced air.	LOCAL EXHAUST	Vents should be situated to avoid higher than normal concentration of oxygen in work areas.
	MECHANICAL (General)	
	SPECIAL	

PROTECTIVE GLOVES
(Liquid) Loose-fitting gloves of impermeable material, such as leather. (Gas) Leather work gloves are recommended when handling compressed gas cylinders.

EYE PROTECTION
(Liquid) Chemical goggles or safety glasses. (Gas) Safety glasses are recommended when handling high pressure cylinders.

OTHER PROTECTIVE EQUIPMENT
N/A

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION
Oxygen shipment must be in accordance with Department of Transportation (DOT) regulations using DOT "OXIDIZER" label. Consult DOT regulations for details on the shipment of hazardous materials.

SPECIAL HANDLING RECOMMENDATIONS
Prevent contact of liquid oxygen with exposed skin. Prevent entrapment of liquid in closed systems. Use only in well ventilated areas. Cleanliness and compatibility of materials in contact with oxygen are essential especially internal parts of piping systems. Some elastomers (o-rings, valve seats, etc.) are not compatible with oxygen. Open oxygen valves slowly. Compressed gas cylinders contain oxygen at extremely high pressure and should be handled with care. Use a pressure-reducing regulator when connecting to lower pressure piping systems. Secure cylinders when in use. Never use direct flame to heat a compressed gas cylinder. Use a check valve to prevent back flow into storage containers. Avoid dragging, rolling, or sliding cylinders, even for a short distance. Use a suitable hand truck. For additional handling recommendations on compressed gas cylinders, consult Compressed Gas Association Pamphlet P-1.

SPECIAL STORAGE RECOMMENDATIONS
Store liquid containers and cylinders in well ventilated areas. Do not store cylinders of oxygen within 20 ft. of flammable or combustible materials, especially oil or grease. Keep cylinders away from source of heat. Storage should not be in heavy traffic areas to prevent accidental knocking over or damage from passing or falling objects. Valve caps should remain on cylinders not connected for use. Never lubricate valves or cylinder caps. Segregate full and empty cylinders. Storage areas should be free of combustible material. Avoid exposure to areas where salt or other corrosive chemicals are present. See Compressed Gas Association Pamphlet P-1 for additional storage recommendations.

SPECIAL PACKAGING RECOMMENDATIONS
Gaseous oxygen containers meet DOT specifications or American Society of Mechanical Engineers (ASME) codes. Liquid oxygen is stored in vacuum-insulated containers meeting DOT specifications or ASME codes.

OTHER RECOMMENDATIONS OR PRECAUTIONS
Oxygen is not to be used as a substitute for compressed air. Applications such as cleaning, dusting, powering pneumatic tools, etc., are not safe due to lubricating oils and other materials present. Use only with equipment specifically designed and cleaned for oxygen service. Consult Compressed Gas Association Pamphlet G-4.1, "Cleaning Equipment for Oxygen Service," for details. Liquid oxygen is cryogenic liquid. Materials of construction must be selected for compatibility with extremely low temperatures. Avoid use of carbon steel and other materials which become brittle at low temperatures. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder filled without the permission of the owner is a violation of Federal Law. If oxygen concentrations exceeding 25% are suspected or can occur, use oxygen monitoring equipment to test for oxygen-enriched atmospheres.

*Various Government agencies (i.e., Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation handling, storage or use of this product which will not be reflected in this data sheet. The customer should review these regulations to ensure that he is in full compliance.